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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,276	11/13/2003	Koji Ando	031267	5648

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EXAMINER	
WILKINS III, HARRY D	
ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 06/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/706,276	ANDO ET AL.	
	Examiner	Art Unit	
	Harry D. Wilkins, III	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 13 November 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 11/13/03.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6 and 9-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duggan (GB 2,122,592) and Atwood et al (US 3,785,944) and Cain (US 1,980,381).

Duggan teaches (see abstract and pages 1-2) a process for the extraction of metal values including (3) a solvent extraction step for a cuprous chloride/ferrous chloride solution using a water immiscible organic solvent and a step of stripping the copper from the organic solvent to produce a stripping product liquor containing the cuprous ion and an aqueous solution containing the ferrous ion. The liquor containing the cuprous ion was subjected to electrowinning to produce electrolytic copper and spent electrolyte.

Duggan teaches (see page 1, lines 34-55) that the cuprous-ferrous chloride solution was produced by leaching of complex sulphide ores using ferric chloride and or cupric chloride, but did not give details of the leaching method.

Atwood et al teach (see abstract and col. 3, line 51 to col. 4, line 15) teach a process of treating chalcopyrite ore ($CuFeS_2$) to create a cuprous-ferrous chloride solution by (1) a chloride-aided leaching step for leaching the raw copper material

(chalcopyrite) in the presence of chlorine in an acidic, aqueous chloride solution to produce a leaching product liquor containing copper ion an residue containing elemental sulfur and (2) a copper ion reduction step for reducing the leaching product liquor in the presence of a reductant to produce a reduction product liquor containing cuprous ions.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the cuprous/ferrous chloride solution to be separated by the method of Duggan by the process of Atwood et al because the process of Atwood et al was able to readily form the desired solution without producing undesired or environmentally harmful by-products such as sulfuric acid.

The combination of Duggan and Atwood et al do not teach a step of iron electrowinning of the aqueous solution containing the ferrous ion.

However, Cain teaches the concept of (5) producing electrolytic iron by electrowinning a ferrous chloride solution.

Therefore, it would have been obvious to one of ordinary skill in the art to have performed electrowinning of the aqueous solution containing the ferrous ion as taught by Cain in order to also create pure iron from the chalcopyrite ore of Atwood et al. Since the chalcopyrite ore contained iron, then without the iron electrowinning step, iron would have continued to build-up within the process solution and caused problems when the solution became saturated with ferrous/ferric ions.

Regarding claim 2, Atwood et al teach (see col. 15, lines 10-26) that make-up chlorine may be added to the process solution for the additional benefit of it oxidizing power. Thus, one of ordinary skill in the art would have found it obvious to have blown

the make-up chlorine into the acidic, aqueous chloride solution in order to have increased the oxidizing power of the leaching solution to remove the copper and iron from the chalcopyrite ore.

Regarding claim 3, Atwood et al teach (see col. 12--14) that the oxidation (leaching) stage preferentially occurs at a temperature of 107°C, that the oxidation potential of the leaching solution were known to be result effective. It would have been within the ability of one of ordinary skill in the art to have optimized these known result effective variables in order optimize the efficiency of the leaching process.

Regarding claim 4, based on the values in figure 2 of Atwood et al, the concentration of chloride ion was controlled to 345 g/L.

Regarding claim 5, the copper ion reduction step of Atwood et al included using chalcopyrite (a copper sulfide mineral) as the reductant.

Regarding claim 6, the leaching step of Atwood et al was conducted at elevated (~100°C) under atmospheric pressure.

Regarding claim 9, Atwood et al suggest (see figures 1 and 2) recycling the residue from the reduction stage to the oxidation stage.

Regarding claims 10 and 11, the solvent extraction step of Duggan utilized an organic solvent. The solvent was considered to be 100% of the volume.

Regarding claim 12, it would have been obvious to one of ordinary skill in the art to have optimized the concentration of the stripping solution of Duggan in order to optimize the concentration of the solution for copper electrowinning.

Regarding claim 13, it would have been obvious to one of ordinary skill in the art to have found the optimum temperature at which to have operated the stripping process of Duggan to have optimized the efficiency of the stripping to ensure enough copper was extracted from the organic solvent.

Regarding claim 14, Duggan teaches (see page 2, lines 24-40) using a divided electrowinning cell with the stripping product liquor being fed to the cathode chamber and a ferrous chloride solution being fed to the anolyte chamber. It would have been obvious to one of ordinary skill in the art to have fed the spent catholyte (containing ferrous chloride) from the iron electrowinning cell to the anode chamber of the copper electrowinning cell in order to have regenerated the ferric chloride solution to be returned to the first oxidation stage.

Regarding claim 15, it would have been within the ability of one of ordinary skill in the art to have selected an optimum diaphragm for the divided electrowinning cell.

Regarding claim 16, since the anolyte contained iron ions and dissolved chlorine, it would have been obvious to one of ordinary skill in the art to have increased the pressure on the catholyte side of the diaphragm in order to have prevented anolyte from flowing into the catholyte. One of ordinary skill in the art was aware that increasing the hydraulic head, such as by increasing the height of the liquid, was a manner in which adjacent liquids could be adapted to have different pressures.

Regarding claim 17, it would have been obvious to one of ordinary skill in the art to have recycled the spent copper electrowinning catholyte to be the aqueous stripping solution and the spent copper electrowinning anolyte (previously the spent iron

electrowinning catholyte) to be the chloride leaching solution in order to reduce waste in the process.

Regarding claim 18, Cain teaches electrowinning of iron in a divided electrolysis cell. It would have been obvious to one of ordinary skill in the art to have optimized the flow rates of anolyte and catholyte in order to have achieved optimum current density and voltage profiles.

Regarding claims 19 and 20, Cain teaches (see figure and paragraph spanning pages 3 and 4) preliminary sulfidation treatment of the electrolyte.

Regarding 21, it would have been obvious to one of ordinary skill in the art to have conducted appropriate processing of the sludge produced by the leaching process in order to provide adequate recovery of expensive precious metals. Such process are well known in the art of metal ore processing.

3. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duggan (GB 2,122,592) and Atwood et al (US 3,785,944) and Cain (US 1,980,381) as applied to claims 1-6 above, and further in view of Baczek et al (US 4,256,553).

Regarding claims 7 and 8, Atwood et al fail to teach control of the size of the chalcopyrite particle size.

However, Baczek et al teach (see col. 4, lines 27-35) that the size of the milled chalcopyrite particles was a known result effective variable in the copper leaching process.

Therefore, it would have been with the ability of one of ordinary skill in the art to have optimized the size of the chalcopyrite particle diameter in order to have optimized the rate and completion of the leaching process as taught by Baczek et al.

Since Baczek et al teach that the particle diameter affected the reaction rate and completion, it would have been obvious to one of ordinary skill in the art to have determined the requisite temperature required for completion of the reaction.

4. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duggan (GB 2,122,592) and Atwood et al (US 3,785,944) and Cain (US 1,980,381) as applied to claims 1-6 above, and further in view of Subramanian et al (US 4,229,270).

Duggan and Atwood et al fail to teach a second electrorefining step producing silver slime.

However, Subramanian et al teach (see col. 1, lines 10-42) using impure copper deposits (such as those formed by the copper electrowinning process of Duggan), as anodes in an electrorefining cell to produce pure copper and recoverable silver slime.

Therefore, it would have been obvious to one of ordinary skill in the art to have performed a second electrowinning step, i.e.-electrorefining, in order to fore a pure copper product and to recover any silver or other metal impurities.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Harry D Wilkins, III
Primary Examiner
Art Unit 1742

hdw